DOCUMENT RESUME

ED 327 980 EA 022 663

AUTHOR Gough, Deborah
TITLE Thinking about Thinking.
INSTITUTION National Association of Elementary School Principals, Alexandria, VA.
PUB DATE 91
NOTE 6p.
PUB TYPE Collected Works - Serials (022)
JOURNAL CIT Research Roundup; v7 n2 Win 1991

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Creative Thinking; *Critical Thinking; Educational Strategies; Elementary Secondary Education; Instructional Improvement; Problem Solving; Program Descriptions; Teaching Methods; Teaching Models; *Thinking Skills

ABSTRACT

This document summarizes five studies that offer insight into the nature of higher-order thinking skills and the most effective methods for teaching them to students. The reviews outline the conclusions, definitions, recommendations, specific methods of teaching, instructional strategies, and programs detailed in the documents themselves. Strategies mentioned include the Concept Attainment Model, the Inductive Thinking Model, the Group Investigation Model, a continuum of teaching styles, classroom climate, listening, wait-time, active learning, recognition, a contingency strategy, and a permeation strategy. The documents reviewed include: "Understanding Thinking Skills" (Bijaya K. Shrestha); "Teaching Critical Thinking Skills in the Psychomotor Domain" (Ron E. McBride, Carl C. Gabbard, Glenn Miller); "Critical and Creative Thinking in the Classroom" (Jerry L. Thacker); "Integrating Thinking Skills into the Curriculum" (Barry K. Beyer, and Judith Dorsch Backes); and "How to Keep Thinking Skills from Going the Way of All Frills" (Carl Bereiter). The unifying theme in these reports is a belief that thinking skills should not be taught in isolation, but rather integrated across the curriculum. (CLA)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

VOLUME 7, NUMBER 2

WINTER 1991

Research ROUNDUP

NATIONAL ASSOCIATION OF ELEMENTARY SCHOOL PRINCIPALS

ED327980

Thinking About Thinking

Deborah Gough

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

EA 022 663

VOLUME 7, NUMBER 2

WINTER 1991

Research ROUNDUP

NATIONAL ASSOCIATION OF ELEMENTARY SCHOOL PRINCIPALS

Thinking About Thinking

Deborah Gough

Higher-order thinking is a concern at the forefront of the educational reform movement. There are several possible reasons for the recent explosion of interest in improving students' critical thinking skills.

First, a number of sources including the National Assessment of Educational Progress have documented the fact that many students lack higher-order thinking abilities. Although recent NAEP results in various subjects have found improved average student performance on lower-order thinking skills such as mathematical computation and word recognition, these same tests consistently show poor student performance on higher-order skills such as analyzing and interpreting information.

Second, interest in thinking skills instruction is fueled by the hope that such an approach—as opposed to rote memorization, drill, and repetition—will promote excitement and enthusiasm in the classroom, and thus raise overall student achievement.

Perhaps most importantly in today's information age, thinking skills are viewed as crucial for educated persons to cope with a rapidly changing world. Many educators believe that specific knowledge will not be as important to tomorrow's workers and citizens as the ability to learn and to make sense of new information.

The five studies reviewed here offer insight into the nature of these crucial higher-order thinking skills and the most effective methods for teaching them to students. A unifying theme in these reports is the belief that thinking skills should not be taught in isolation, but rather integrated across the curriculum.

Bijaya Shrestha gives an overview of the many definitions of thinking skills. Although educators have not reached agreement about a precise definition, the author maintains that current research is sufficient to develop and implement effective thinking skills curricula. Such curricula, he cautions, must include substantive content that relates to students' real lives.

Ron McBride and his colleagues examine four instructional models that can enhance critical thinking. Two of these models—Concept Attainment and Inductive Thinking—are designed to give students practice in categorizing, differentiating, and organizing information in order to develop concepts and make generalizations. The Group Investigation Model adds a social dimension to problem-solving activities. Finally, a model based on a continuum of teaching styles helps teachers to choose more student-centered instructional strategies.

Jerry Thacker describes an instructional program developed and implemented by four Indiana school districts. The program assists teachers in creating the open, supportive, and structured classroom environment essential for the development of higher-order thinking. Necessary components of such an environment include active listening, increased wait-time for student responses, the teacher serving as a facilitator, and the acceptance by students and teachers alike that errors are a natural part of the learning process.

Barry Beyer and Judith Dorsch Backes write that a coherent thinking skills program depends on the creation of a comprehensive scope and sequence plan. They describe such a plan now in operation in Walled Lake Consolidated Schools. New thinking skills are introduced at each grade level and are tied to the content required by the district curriculum.

Finally, Carl Bereiter offers two strategies to prevent thinking skills from becoming a mere frill in the curriculum. Bereiter asserts that, in order to succeed, thinking skills instruction must be deeply embedded in the whole fabric of the instructional program.

Deborah Gough is Coordinator of Publications and Editorial Services, Educational Research Service, Arlington, Virginia.

EA 022 663

(1) Shrestha, Bijaya K. **Understanding Thinking Skills.** Eugene OR: Oregon School Study Council, December 1989. 38 pages.

In an *OSSC Bulletin*, Bijaya Shrestha discusses how thinking skills can help students to cope with the fast-approaching 21st century. From his review of existing programs, the author concludes that such skills are best taught in combination with substantive content.

Before teachers can do a better job of teaching thinking skills, they must clearly define them. But defining thinking skills has been difficult, writes Shrestha, because of the lack of agreement among educational scholars and practitioners. The author presents some of the definitions developed by educators.

- Barry Beyer divides all thinking skills into two categories. Problem-solving skills include identifying and clarifying a problem, hypothesizing solutions, testing alternative solutions, and choosing and applying the appropriate solutions. Decision-making skills encompass a process from stating a desired goal through choosing the best alternative.
- Benjamin Bloom's *Taxonomy of Educational Objectives* includes six thinking skills: recall, comprehension, application, analysis, synthesis, and evaluation.
- David Perkins discusses creativity as an aspect of thinking skills. Creative thinking, he writes, is a result of attention, purpose, and continuous work. It depends on the ability to break down ideas and rearrange them in different patterns, as well as awareness of the ideas themselves.
- Raymond Nickerson writes that thinking skills cannot be separated from substantive content. To do any thinking, one must think about something. Knowledge will not guarantee effective thinking, but lack of knowledge will certainly prevent it.
- Stiggins and his colleagues differentiate between critical thinking (solving problems and making decisions) and creative thinking (creating ideas or knowledge that did not exist). Critical thinking includes the skills of recall, analysis, comprehension, inference, and evaluation. Creative thinking, not as easily defined, can be recognized by a number of characteristics including confidence in one's own judgment, flexibility, divergent ideas, and intuition.

In spite of varying definitions, Shrestha writes that "we need not wait for research to arrive at a precise definition of thinking skills before we start designing a thinking skills program or selecting one from the available educational packages." Existing programs demonstrate that current research is adequate to design and implement thinking skills curricula. Shrestha cautions, however, that effective programs must closely combine mental techniques with substantive content; in other words, textbook problems must sufficiently resemble real-world problems.

(2) McBride, Ron E., Carl C. Gabbard, and Glenn Miller. **"Teaching Critical Thinking Skills in the Psychomotor Domain."** *The Clearing House for the Contemporary Educator in Middle and Secondary Schools* 63, 5 (January 1990): 197-201.

McBride, Gabbard, and Miller examine four models of teaching that can enhance critical thinking. Although the authors apply these approaches to the psychomotor (sports and physical fitness) learning environment, they are applicable to all subjects and grade levels.

The *Concept Attainment Model* is designed to develop inductive reasoning. It is based on the premise that in order to deal with the complex environment in which we live, humans invent categories and form concepts. In concept attainment instruction, students are given information and examples that are similar in some respects and different in others. The students then use the information provided by the teacher to identify and define a concept. An example in the psychomotor domain would be giving students a list of sports activities in which fast- and slow-moving participants represent the key concept. Fast-moving activities might include foot races, ice hockey, and basketball; slow-moving activities might include balance beam and synchronized swimming. Once the concept is identified, movement experiences can then be introduced to allow further exploration of this concept.

The *Inductive Thinking Model* identifies three tasks: concept formation; interpretation of data; and the application of principles. During concept formation, learners identify and then categorize data, engaging in such operations as differentiation, identifying commonalities, and organizing information in a hierarchical fashion. During the interpretation-of-data phase, students learn how to draw inferences and make generalizations about the information they have amassed. The final cognitive task is to apply principles gained from the first two tasks to make predictions about new information. All three phases are prompted by the teacher's use of questions that require more than simple recall responses on the part of the learner.

The *Group Investigation Model* attempts to combine the democratic process with the process of academic inquiry. Students work together in groups of 10 to 15 members to generate and test hypotheses. The individual both actively contributes to the discussion and listens to alternative ideas from other group members. This social process continually generates new information, resulting

in data assessment, concept formation, hypothesis formation and testing, and considering alternatives—all key critical thinking skills. This model is based on the premise that life is social and one cannot act without reference to others.

The fourth teaching model discussed by McBride is Mosston and Ashworth's proposed concept of a *continuum of teaching styles*. Teacher-centered styles, such as direct instruction, are appropriate in some situations and may improve student scores on basic skills tests. However, some researchers have suggested that teacher-centered lessons have a negative overall effect on students' critical thinking. Student-centered styles, such as problem-solving, give students more control over the subject matter and the conditions of the learning-teaching process.

---

(3) Thacker, Jerry L. **"Critical and Creative Thinking in the Classroom."** *ERS Spectrum* 8, 4 (Fall 1990): 28-31.

Thacker describes a model for teaching critical thinking skills that was developed and piloted cooperatively by four Indiana school corporations: Twin Lakes, Hammond, Blackford County, and Eagle-Union. The developers of this model concluded that teachers must be trained to become aware of thinking skills and of the techniques for creating an open, supportive, and structured classroom environment that will set the stage for the development of critical and creative thinking. The model planners identified certain components as essential to the creation of such a classroom environment.

Classroom Climate—Students need to feel free to explore and express opinions, to examine alternative positions on controversial topics, and to justify beliefs about what is true or good, while participating in an orderly classroom discourse. The author lists the following 12 ways through which teachers might be better able to create such a climate in their own classrooms:

- setting ground rules well in advance;
- providing well-planned activities;
- showing respect for each student;
- providing non-threatening activities;
- being flexible;
- accepting individual differences;
- exhibiting a positive attitude;
- modeling thinking skills;
- acknowledging every response;
- allowing students to be active participants;
- creating experiences that will ensure success at least part of the time for each student; and
- using a wide variety of modalities.

Listening—Teachers need to practice the art of simply listening to their students. Time must be built into the lesson plan so that no one feels pressured by "getting behind" in the material.

Wait-Time—Teachers in the project found that when they expanded the time between asking a question and expecting an answer, students tended to respond in phrases and sentences rather than one-word answers. Students also became aware that each of them would be expected to participate actively in classroom discussions.

Active Learning—Rather than viewing themselves as imparters of knowledge and their students as passive recipients, teachers must encourage their students to question, to analyze, and to look for all possible answers. Teachers should be facilitators.

Recognition—This should not be confused with praise. Recognition is a response, not necessarily positive or negative, that affirms the contribution each student makes to the class. Teachers should create a positive atmosphere and trusting relationship with students, reinforcing the idea that all students will be respected and treated equally. Errors by students and teachers should be considered part of the learning process, not mistakes.

---

(4) Beyer, Barry K. and Judith Dorsch Backes. **"Integrating Thinking Skills into the Curriculum."** *Principal* 69, 3 (January 1990): 18-21.

Beyer and Backes identify the development of a comprehensive scope and sequence plan for thinking skills as a major challenge for elementary school administrators and curriculum committees. "It is impossible to have a coherent program without such a document," they write.

A plan developed by a faculty committee of the Walled Lake Consolidated Schools in Michigan serves as an example. This comprehensive plan establishes two or three new thinking skills to be introduced at each grade level and reviewed in succeeding grades. Each thinking skill is also tied to the content required by the

About Educational Research Service

Educational Research Service (ERS) is an independent, nonprofit agency providing information and research for local school district decisions. ERS is sponsored by NAESP and six other national school managment associations: American Association of School Administrators • American Association of School Personnel Administrators • Association of School Business Officials • Council of Chief State School Officers • National Association of Secondary School Principals • National School Public Relations Association.

Local school districts enrolling more than half the nation's public school pupils maintain an annual order for ERS services, receiving a wide range of information resources. For more information about ERS, call or write Dr. Glen Robinson, President, or Dr. John Forsyth, Vice President, Educational Research Service, 2000 Clarendon Boulevard, Arlington, VA 22201. Phone: (703) 243-2100. Fax: (703) 243-1985.

district curriculum. For example, the skill of classifying is introduced in kindergarten in the science curriculum, reviewed in science in grades 1 and 2, and incorporated into the social studies curriculum in grades 3 through 6.

The authors suggest guidelines for developing a thinking skills scope and sequence plan:

1. Design the plan from the top down. Determine first what skills graduates of elementary school ought to have mastered; then work backward through the grades to kindergarten, identifying prerequisite skills.
2. Think small. Agree on a limited nucleus of skills that will be frequently used by students in a variety of subjects.
3. Revise the plan regularly. Provide opportunities every year or two to add new skills, redefine current skills, and eliminate others.
4. Consider the listed skills to be the minimum, allowing teachers to add other thinking skills.
5. Emphasize the school's commitment by posting the thinking skills scope and sequence plan in a prominent place in every classroom.

---

(5) Bereiter, Carl. **"How to Keep Thinking Skills from Going the Way of All Frills,"** in *Readings from EDUCATIONAL LEADERSHIP: Teaching Thinking*, edited by Ronald S. Brandt. Alexandria, VA: Association for Supervision and Curriculum Development, 1989. 215 pages.

The author, drawing on his "15 occasionally frustrating years of school-based experiments on promoting thinking skills," warns that thinking skills instruction will probably not succeed if such skills are treated as enrichment or as separate subject matter. He proposes two main ways to guard against failure.

A *contingency strategy* involves making thinking skills activities an integral part of other, already-accepted instructional objectives. For example, in developing an elementary mathematics curriculum, the author and his colleagues decided at the outset that mathematical thinking games that provided practice in higher-order thinking should be part of the daily activities of all students from kindergarten up. These games all had a dual function: they involved some kind of mathematical reasoning or problem solving, but at the same time they played a significant role in reinforcing specific math concepts or computational skills. Experience with several hundred field test classes indicated that teachers did not treat games of this dual-purpose nature as "frills," but instead used these games regularly as part of their instructional programs.

Under a *permeation strategy*, the instructional program is permeated so thoroughly with thinking skills activities that they cannot be isolated and reduced to verbalized subject matter. The principles for promoting thinking skills are applied in every possible aspect of the instructional program. Thus, in the mathematics curriculum mentioned above, word problems that all require the same thinking operation are not grouped together but are spread throughout the lessons, so that students must continually think about what operation to use.

Both the contingency strategy and the permeation strategy spring from the same basic idea—that thinking skills should be deeply embedded in the whole fabric of an instructional program. Bereiter suggests that educators must begin demanding such an approach from publishers of instructional materials.

NATIONAL ASSOCIATION OF ELEMENTARY SCHOOL PRINCIPALS
1615 Duke Street
Alexandria, Virginia 22314

Research Roundup, Vol. 7, No. 2, Winter 1991
(ISSN 8755-2590)

Thinking About Thinking

Nonprofit Org.
U.S. Postage
PAID
Washington, D.C.
Permit #8009

RNDUP 540+.
Dr. Philip K. Piele
ERIC Clearinghouse
1787 Agate St.
Eugene, OR 97403-1923